oleophobic, whereas the applied references describe conventional "smooth" fluorocarbon surfaces.

The term "ultraphobic" is known to refer to a specific type of surface which is both "rough" and hydrophobic. For example, Applicants enclose herewith a printout from the SuNyx Surface Technology website in which the term "ultraphobic surfaces" describes a rough surface having a thin "hydrophobic polymer film" coating (see the diagram on the website printout). Thus, the term "ultraphobic" has a specific meaning known in the art of hydrophobic coatings.

The claimed method provides an "ultraphobic" surface on metal, glass, ceramic, plastic, or composite metal and plastic supports by roughening the surface with a fluid jet containing solid blasting agents having a particle size of < 200 μm, then coating the roughened surface with a thin hydrophobic coating. The roughened surface of the support material, after fluid jet blasting, has depressions on the order of from 2 μm to 500 μm (page 3, lines 1-3 of the specification). The hydrophobic coating (and optional adhesion promoting layer) is substantially thinner than the dimensions of the surface roughness. For example, in Example 1 the roughened substrate has "raised areas 50 to 200 μm in size" (page 12, lines 14-15), and is coated with a gold layer (adhesion promoting layer) which is "approximately 50 nm-thick" (specification at page 12, line 17), and then is coated with "a few drops of a solution of n-perfluorooctanethiol in α,α,α-trifluorotoluene," rinsed with α,α,α-trifluorotoluene, and dried. As a result, the thin gold layer is coated with a monomolecular layer of n-perfluorooctanethiol (the thiol group is known to form a complex with the gold surface, and excess n-perfluorooctanethiol is washed off). Applicants note that the combined thickness of the gold layer and monomolecular layer of n-perfluorooctanethiol would reasonably be substantially less than the dimensions of the "raised areas" of the substrate, and therefore the hydrophobic coating does not substantially reduce the

"roughness" imparted by the fluid jet blasting step. Thus, Example 1 of the specification describes a surface having a roughness of 50-200 μm, and which is hydrophobic due to the n-perfluorooctanethiol monolayer. As noted at page 12, line 29, the static contact angle for water of this surface is >160° whereas it is known that a conventional Teflon surface cannot achieve a contact angle with water of >120°. Thus, ultraphobic surfaces have a structure and surface properties which are different from conventional hydrophobic surfaces (e.g., Teflon).

The rejections of the claims under 35 U.S.C. § 102(b) and § 103(a) over Tsai, Porter, DE4132534, Toy, Li, Heck, Papst, Suzuki, and Hoffman, are respectfully traversed. The applied references, either individually or in combination, describe conventional hydrophobic surfaces having a relatively smooth hydrophobic coating, not the ultraphobic surfaces provided by the claimed method.

Tsai describes metal cookware which is roughened by sandblasting with aluminum oxide and then coated with a PTFE layer (column 1, lines 47-61). The surface roughness of the cookware is 4.5-5.5 μm (column 2, line 8), and the thickness of the PTFE coating is 23-36 μm (column 1, line 60). After coating, the PTFE surface has a roughness of 2.5-5.5 μm (column 2, line 14). The Teflon coated surfaces of Tsai are therefore much smoother than ultraphobic surfaces (e.g., Example 1 of the present application). This is because the Teflon coating of Tsai is substantially thicker than the dimensions of the roughness imparted by sandblasting, whereby the thick Teflon coating "fills in" the depressions of the roughened surface. In contrast, ultraphobic surfaces have a hydrophobic coating which is substantially (e.g., ~1000 times) thinner than the dimensions of the surface roughness. For example, the roughness of the ultraphobic surface of Example 1 of the present specification is essentially the same as the roughness of the fluid jet blasted surface (i.e., 50-200 μm), due to the extreme thinness of the hydrophobic coating (~50 nm). In comparison, the ultimate roughness of the Teflon layer of Tsai is only 2.5-5.5 μm.

Likewise, Porter also describes a process similar to that of Tsai for preparing conventional, thick Teflon coatings on sandblasted substrates. The Teflon coating of Porter is 0.0005-0.0015 inches thick (i.e., 12.7-38.1 μm; column 8, line 53). Although Porter fails to describe the dimensions of the roughened substrate, one would reasonably assume that the abrasive blasting step of Porter (column 9, lines 54-55) would provide a roughness similar to that of the method of Tsai. Thus, Porter also describes a method for preparing a conventional, smooth Teflon surface, not the ultraphobic surface provided by the claimed method.

As discussed above, an ultraphobic surface is relatively rough and has an extremely thin hydrophobic coating. It is this combination of roughness and hydrophibicity that provides substantially different surface properties compared to the conventional hydrophobic coatings exemplified by Tsai and Porter. For example, ultraphobic surfaces provided by the claimed method are "self cleaning" due to the extremely poor adhesion of water and soil particles to ultraphobic surfaces (e.g., specification at page 9). Thus, neither Tsai nor Porter anticipate nor suggest the claimed ultraphobic coatings.

Applicants note that all of the rejections rely on either Tsai or Porter as teaching a hydrophobic coating on a roughened substrate. As discussed above, the Teflon coated surfaces of Tsai and Porter are fundamentally different, and have different properties compared to the ultraphobic surfaces of the claimed method, because the surfaces of Tsai and Porter are relatively smooth hydrophobic surfaces, whereas ultraphobic surfaces are comparatively rough and hydrophobic. Thus, the combination of Tsai or Porter with the remaining applied references also fails to suggest the claimed method. Accordingly, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. §§102(b) and 103(a).

Applicants wish to thank the Examiner for her indication, during the interview of April 15, 2003, that the specification does describe transparent substrates (i.e., at page 10, lines 19-23 of the present specification), and that the terms "long" and "thin" are definite. In this regard, Applicants note that the U.S. Court of Appeals for the Federal Circuit has recently ruled that terms such as "substantially" are not indefinite if one of experience in the technical field would understand its meaning (Verve LLC v. Crane Cams, Inc., 65 USPQ 2d 1051 (CAFC, 2002)). In a similar manner, Applicants respectfully submit that one of experience in the field of sandblasting and producing ultraphobic surfaces would understand the meaning of the term "long" in regard to the period of blasting a surface, and would understand the meaning of the term "thin" in regard to the thickness of a layer of gold adhesion promoter. Furthermore, Applicants note that the specification describes blasting treatment times of 0.1 to 10 minutes (page 3, line 19) and a thickness of an adhesion promoter of 10-100 nm (page 8, line 19). Thus, there is ample guidance in the specification in regard to the meaning of the terms "long" and "thin".

As discussed above, the term "ultraphobic" is known to refer to a specific type of surface which has a structure and surface properties which are different from conventional hydrophobic coatings. Thus, the preamble of Claims 13 and 24 is not indefinite.

Claims 24-31 have been amended to replace the article "The" with the article "A."

Accordingly, Applicants respectfully request that the rejections under 35 U.S.C. § 112, first and second paragraph, be withdrawn.

Applicants respectfully request withdrawal of the objection to Claim 13. Claim 13 has been amended in the manner suggested by the Examiner.

RESPONSE TO REQUIREMENT FOR ELECTION OF SPECIES

Applicants have provisionally elected, with traverse, the species of metal support materials. Claims 13-28 read on the elected species, and Claims 13-27 are generic.

REMARKS

Applicants have provisionally elected, for search and examination purposes only, the species of metal support materials. Restriction is only proper if the inventions of the restricted groups are either independent or patentably distinct, and there is a burden in searching the entire application. M.P.E.P. § 803. Applicants respectfully traverse the requirement for restriction on the grounds that the Office has not provided any reasons to support the conclusion of patentable distinctness. Rather, the Office has merely concluded that the species of support material are patentably distinct.

Applicants make no statement regarding the patentable distinctness of the species, but note that for restriction to be proper there must be a patentable difference between the species as claimed. M.P.E.P. § 808.01(A). The Office has not provided any reasons or examples to support a conclusion that the species are, indeed, patentably distinct. Accordingly, Applicants respectfully submit that restriction is improper, and Applicants' election of species is for search and examination purposes only. With respect to the elected species, Applicants respectfully submit that should the elected species be found allowable, the Office should expand its search to the non-elected species.

Finally, Applicants respectfully submit that the Office has not shown that a serious burden exists in searching the entire application.

Accordingly, and for the reasons stated above, Applicants respectfully request withdrawal of the rejections and objections. Applicants submit that the present application is now in condition for allowance, and early notification thereof is earnestly solicited.

Respectfully submitted,

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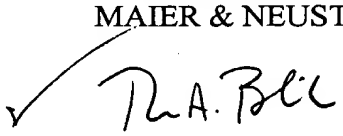
MAIER & NEUSTADT, P.C.



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IN THE SPECIFICATION

Prior to page 1, line 1, please insert the following heading:

TITLE OF THE INVENTION

Prior to page 1, line 10, please insert the following heading:

BACKGROUND OF THE INVENTION

Prior to page 2, line 10, please insert the following heading:

BRIEF SUMMARY OF THE INVENTION

Prior to page 2, line 19, please insert the following heading:

DETAILED DESCRIPTION OF THE INVENTION

Please replace the heading at page 17, line 1 with the following heading:

CLAIMS [Patent Claims]

Please replace the heading at page 19, line 1 with the following heading:

ABSTRACT OF THE DISCLOSURE [Abstract]

IN THE CLAIMS

--13. (Amended) A method for producing an ultraphobic surface on metal, glass, ceramic or plastic or a composite of metal and plastic as support material, comprising intensively roughening [the] a surface of the support material with a fluid jet containing a solid blasting agent[s] over a long period, the blasting agent having a particle size of < 200 μm, optionally coating with an adhesion promoter layer and then providing a hydrophobic and/or oleophobic coating.

19. (Amended) The method according to claim 13, wherein the surface of the support material is roughened using a fluid jet at a blasting pressure of from 3 to 7 bar and at a distance from the die head to the surface of from 1 to 3 cm.

24. (Amended) [The] An ultraphobic surface obtained by a method according to claim 13.

25. (Amended) [The] A material or construction material having an ultraphobic surface obtained by a method according to claim 13.

26. (Amended) [The] A method of reducing friction comprising lining vehicle bodies, aircraft fuselages or hulls of ships with an ultraphobic surface obtained by a method according to claim 13.

27. (Amended) [The] A method to produce self cleaning ultraphobic surfaces comprising coating building structures, roofs, windows, ceramic construction material with ultraphobic surfaces obtained according to claim 13.

28. (Amended) [The] A method for rust protection comprising coating metal objects with an ultraphobic surface obtained by a method according to claim 13.

29. (Amended) [The] A method to produce a self-cleaning ultraphobic surface comprising topcoating transparent sheets with an ultraphobic surface obtained by a method according to claim 13.

30. (Amended) [The] A method to produce a self-cleaning ultraphobic surface comprising topcoating transparent glass and plastic sheets with an ultraphobic surface obtained by a method according to claim 13.

31. (Amended) [The] A method to produce a self-cleaning ultraphobic surface comprising topcoating transparent sheets for solar cells, vehicles or greenhouses with an ultraphobic surface obtained by a method according to claim 13.--